

Space News **ROUNDUP!**

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Shuttle-Mir bringing world together

Foale says America, Russia displaying economic leadership

After four months on orbit, Astronaut Mike Foale says he believes the most important benefit America and Russia derive from the on-going program of shuttle-Mir docking missions is recognition as peaceful world leaders.

"I think the benefit is in two countries working together. And most extraordinarily, it's America leading the world and bringing the world together in these economic industrial

endeavors in space," Foale said in an Oct. 28 news conference, less than a month after the completion of his 145-day stay in space. "That is really, absolutely extraordinary, and I think we'll go down in history.

"The rewards for America, for its leadership in this, are not entirely monetary," Foale continued. "I also believe at a totally different level, business watches what's going on here between our countries and they

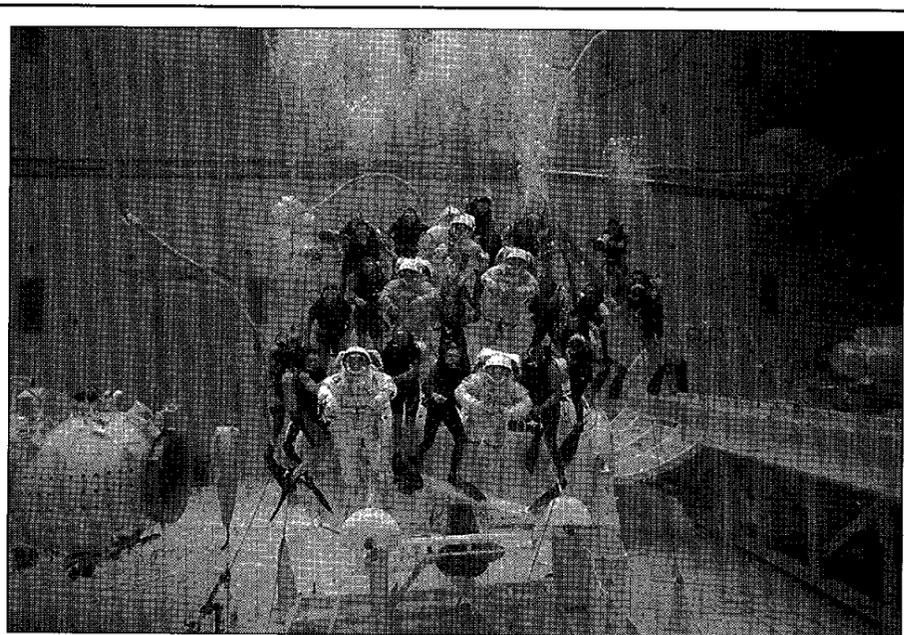
are not related to space in any way, but they feel confident now to invest in Russia, to work in Russia, because they see this harmony, this work together at the higher level in the space programs."

Foale said the two countries' space programs also are complementary in terms of hardware. Russia, he said, has skill and expertise in large launches that America

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Michael Foale



WET WORK—Four astronauts, one space walk training expert and their support divers complete the first dual run operation in the new Neutral Buoyancy Laboratory at the Sonny Carter Training Facility near Ellington Field. The Oct. 24 test involved Astronauts Leroy Chiao, Paul Richards, Shannon Lucid, Mike Lopez-Alegria and Mission Operations EVA Trainer Kieth Johnson. Story and more photos on Page 2.

JSC Photo S97-15505 by Robert Markowitz

JSC offers limited buyout

JSC once again is offering buy-outs for a limited number of employees if they leave by Jan. 3. The buyout is intended to help NASA meet its workforce targets in future years.

Buyouts of up to \$25,000 are available for up to 68 selected JSC employees who voluntarily retire or resign between Nov. 19 and Jan. 3.

"Our plan is designed to help us meet budget and staffing levels while ensuring that we meet critical program commitments and milestones, and that we continue to do so safely," said Human Resources Director Harvey Hartman. "This is a small buyout, designed to have minimal impact to any one organization. We have protected our difficult to fill positions such as astronauts, doctors and pilots, and tried to provide a few opportunities for secre-

taries and technicians."

The new opportunity follows last year's buyout, of which 117 employees took advantage. Hartman said last year's buyout and higher than forecast attrition this year have reduced, but not eliminated, the need for this fiscal year 1998 buyout.

The buyout is a lump-sum incentive payment based upon years of service and salary history up to a maximum gross amount of \$25,000.

Permanent civil service employees who are Senior Executive Service, senior scientific and technical, or grades GS-12-15 with at least one year of NASA service are eligible, but there is a limited number of slots in each eligible organization. Employees with higher grade levels and longer service will be given priority.

Please see **BUYOUT**, Page 8

'Super Guppy' to support station

JSC welcomed a new aircraft into NASA's fleet recently when a wide-bodied "Super Guppy" designed to carry oversized cargo in support of the International Space Station arrived at Ellington Field.

"As we get into 1998, we're going to be assembling the space station and the Super Guppy is going to play a very important role in that program," said JSC Director George Abbey. "It's going to allow us to move the elements around the country, will allow us to make sure we deliver those elements to the Cape in time to fly and play an extremely important role in all our activities."

The giant aircraft was delivered to Ellington on Oct. 23 by Airbus Industries. Acquisition was a joint effort involving NASA, the French

and European Space Agencies and Airbus.

International Space Station Program Manager Randy Brinkley said the aircraft will provide a cost-effective method of moving large station elements with the flexibility needed to meet tight development and testing schedules.

"Each one of these large modules that is being transported to KSC for their launch starting next summer is one of a kind, worth hundreds of millions of dollars," Brinkley said.

Flight Crew Operations Director Dave Leestma said the aircraft will be used to transport some of the larger space station articles between their source of manufacturers to their test sites and to the launch facilities at Kennedy Space Center.

Columbia poised for 16-day flight

By Kyle Herring

Columbia is poised on a refurbished launch pad for the final weeks of preparation leading to launch mid-afternoon on Nov. 19. STS-87 will be the eighth and last mission of the year.

As managers settled in for their traditional face-to-face meeting at the launch site during the Flight Readiness Review this past Monday, the five astronauts and one cosmonaut making up the crew flew to Florida for a practice countdown that was scheduled to end Wednesday with a simulated cutoff of the shuttle's main engines.

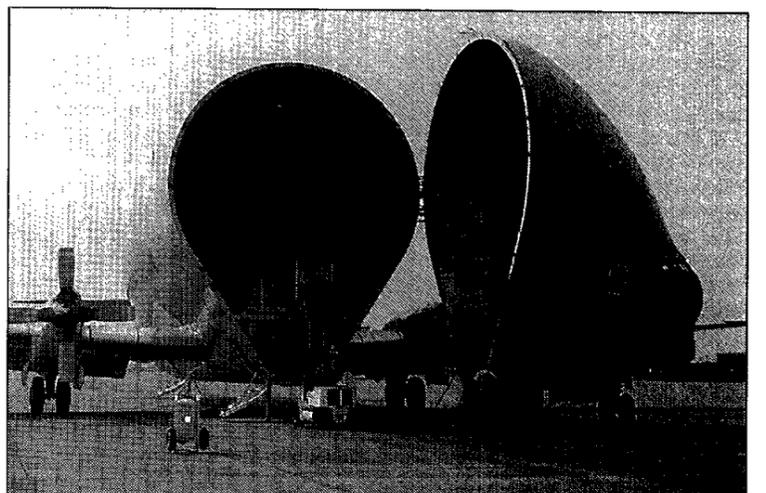
Kevin Kregel will command his first mission and will be accompanied by four first-time flyers and one other veteran. Alongside Kregel in the pilot seat will be Steven Lindsey. Mission specialists will be Kalpana Chawla, Winston Scott and Takao Doi. Ukrainian Cosmonaut Leonid Kadenyuk will make his first flight on any spacecraft as the mission's payload specialist.

While the crew is almost 70 percent "rookie," Kregel praised their professional backgrounds in talking about the flight. "They are all very versed in their different fields and very competent folks and require very little supervision," he says.

The 16-day mission has little room for crew free time. The first half of the mission concentrates on the deployment and retrieval of a Spartan satellite by Chawla, operating the robot arm. The small satellite is designed to garner data on ultraviolet emissions from the Sun as well as its solar wind acceleration region.

During the first day of its free-flight operations, data will be sent directly to the ground for real-time evaluation by investigators as part of a unique communications experiment, which is appropriately labeled TEXAS, for the Technology Experiment Augmenting Spartan. TEXAS will provide fine pointing adjustment for one of the Spartan instruments based on solar images downlinked in real time.

Please see **TINY**, Page 8



NASA's new "Super Guppy" arrives at Ellington Field. With a cargo compartment 25 feet tall, 25 feet wide and 111 feet long, it can carry more than 26 tons. Its hinged nose can open more than 200 degrees.

JSC Photo by Pete Stanley

Wolf first to exercise right to vote from Mir Space Station

By John Lawrence

NASA astronaut David Wolf cast the first ballot from outer space last week, activating a system especially created to extend voting privileges to U.S. astronauts in orbit.

Harris County Clerk Tony Sirvello confirmed receipt of the ballot and reported it "valid and accurate," and in time to be counted with votes in the Nov. 4 general election.

A year ago, astronaut John Blaha aboard Mir lamented his inability to participate in the 1996 elections because he had left Earth before applications for absentee ballots were being processed. The Texas State legislature has since implemented corrective action.

Under the process, an electronic ballot is generated by the county clerk's office with an embedded password. The ballot is then e-mailed to JSC, relayed to flight support team members in Russia and uplinked to Mir.

Aboard the space station, the crew member opens the ballot, records his or her selections, and downlinks the ballot for e-mail return to the county clerk. The concept can be expanded to astronauts from other countries.

Meanwhile, the Russian station continues to be restored to normal operations after a period of technical problems. Wolf, completing his fifth week aboard Mir, has been able to dedicate virtually all of his time to his science duties, a luxury not enjoyed by his predecessors, Mike Foale and Jerry Linenger. In his periodic e-mail "letters of hope," Wolf has provided a relaxed and comfortable view of life aboard Mir and described the docking of a Russian Progress resupply vehicle on Oct. 21 with the same Christmas anal-

ogy used by previous U.S. astronauts, rejoicing in "lots of candy and fresh food for dinner." The laboratory, he said, was "really coming together."

A series of extravehicular activities aboard Mir will further improve the quality of life. Commander Anatoly Solovyev and Flight Engineer Pavel Vinogradov performed a suited excursion into the Spektr module Oct. 20. The Spektr depressurized June 25 after a collision during Progress docking tests. As the module was sealed off, cables from the Spektr solar arrays had to be uncoupled. An earlier EVA inside Spektr routed cables through a hatch plate.

During the Oct. 20 trip into Spektr, Solovyev and Vinogradov redirected cables from the Spektr array avionics box to a similar

avionics box in the Kristall module, restoring the arrays' ability once again to track the Sun. Russian flight controllers said the restored capability should increase power to the station by an additional 15-30 percent. Wolf stayed in the Soyuz capsule during the internal space walk, monitoring Soyuz systems and conducting earth observation photography.

Two more space walks by Solovyev and Vinogradov are being conducted to further increase Mir's capability. Sunday and Monday, the cosmonauts removed an aging solar array on the Kvant-1 module and were scheduled to replace it three days later during another space walk with a new array housed in a compartment on the side of the Mir's docking module. Solovyev and Vinogradov also completed preparatory work for the installation of a second carbon dioxide removal system inside the station.



Dual underwater run tests center's new training capability

By Kelly Humphries

Astronauts, divers, test directors and other support workers recently completed a Dual Run Demonstration Test of the Neutral Buoyancy Facility, the final step in fully certifying the Sonny Carter Training Facility tank.

The test demonstrated the Neutral Buoyancy Lab's ability to support two separate underwater simulations and a total of five space-suited astronauts at the same time, and overcame an added dimension thrown in by the presence of a movie film crew.

"When I walked into the facility that day it made my eyes water," said EVA Project Office Deputy Manager Milt Heflin, chairman of the Operational Readiness Inspection committee. "There was the movie activity going down on one end, then there was the preparation to put the five suited subjects into the water. There were people everywhere and hardware everywhere. Since it came off so well, that just tells me the facility took a giant step to reach this 'dual op' capability."

Bill Langdoc, chief of Space and Life Sciences' Flight Crew Support Division, said the dual operations capability is needed to support a "mountain of training" for International Space Station construction that peaks in the 1999-2000 timeframe.

"In order to support the anticipated training load for space station assembly, we're going to have to be able to train two different crews simultaneously. This capability lets you effectively double your capacity," Langdoc said.

Typical simulations in the past have involved two suited subjects in one end of the 202 by 102 foot, 40-foot-deep NBL tank that holds 6.2 million gallons of water.

"This was the last major activity to verify the completion and readiness of the NBL. With this demonstration we're looking at the NBL being fully operational," he said. "The test went very well. To get to this point, literally hundreds of people have been putting in a lot of hard work."

Leroy Chiao, who joined fellow Astronauts Paul Richards, Shannon Lucid, Mike Lopez-Alegria and Mission Operations EVA Trainer

Kieth Johnson underwater, agreed that the test went smoothly, including a simulated emergency extrication of Johnson.

"I know they've had some hiccups in the past trying to get to dual ops and this shows that the team has worked very hard to make everything work," Chiao said.

Carolyn Fritz, project engineer for the demonstration run and test director who supported the ORI, said teamwork and planning were the keys to its success. The entire team of about 60 people went over the test requirements and objectives, hardware documentation and detailed test procedures prior to the exercise.

"From the ORI certification standpoint, I think the test went very well," she said. "It was pretty much standard operating procedures for us."

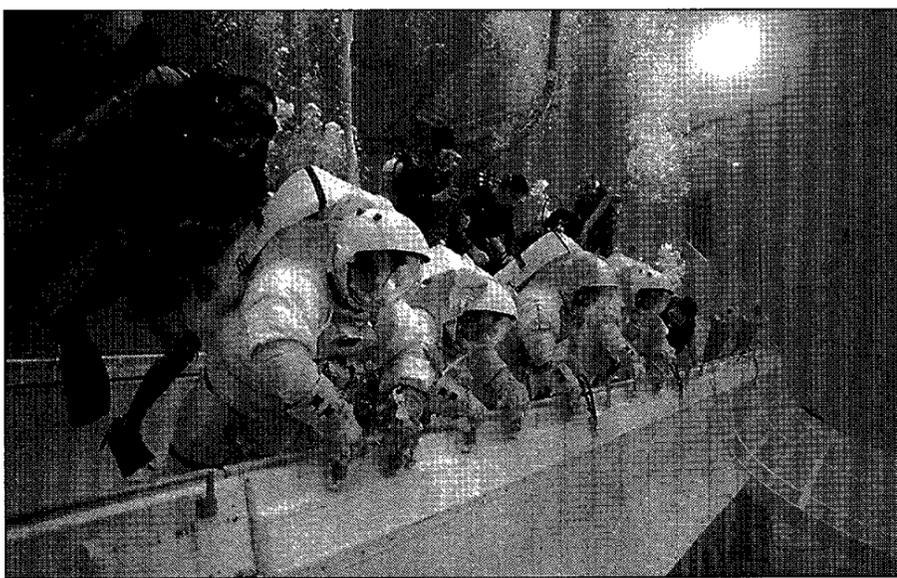
Leslie Schaschi, who served as test director at one end of the tank while her counterpart June Huhn supervised the other, said the team is looking forward to being busy with operational training.

"We'll have every single person out there on a duty station," she said.

An added dimension was the simultaneous filming of the feature film "Armageddon," which took place "topside" during the dual ops run but moved beneath the water after the test. The movie, starring Bruce Willis, involves a NASA team that takes a drilling rig into space to save the Earth from an asteroid. About 35 people, including divers and test subjects, may end up in the movie.

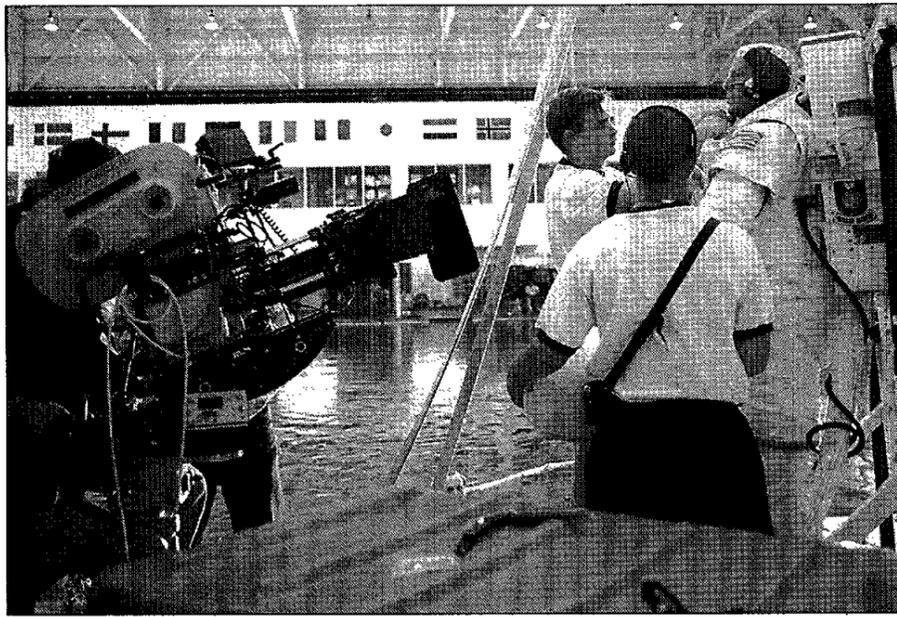
Ron Farris, who served as the Flight Crew Support Division's project manager for film support, said the potential for the filming to become a distraction never materialized as the team did a good job of keeping its attention on the work at hand. Stringent safety rules were imposed on the film crew.

"We knew it was an ambitious, success-oriented day," Farris said. "But we knew we could save a lot of resources and improve the quality of the product to Touchstone if we could combine these two events."



JSC Photo S97-15505 by Mark Sowa and S97-15503 Robert Markowitz

Above: Four astronauts line up along the payload bay sill of an underwater space shuttle mockup during the first dual run operation in the new Neutral Buoyancy Laboratory at the Sonny Carter Training Facility. Astronauts Leroy Chiao, Paul Richards, Shannon Lucid and Mike Lopez-Alegria worked with some 60 NBL test directors, equipment specialists and divers to complete the test, a major milestone in training support for the International Space Station. Below: Actor Bruce Willis, at JSC for filming of the Touchstone Pictures movie "Armageddon" suits up in preparation for an underwater scene. The NBL team supported the filming activities the same day as the important dual run operation.



Chamber test nears end of second month

Commander reports all systems working better than expected

Work inside the Bldg. 7 chamber is going so smoothly that the Phase III crew of the Lunar-Mars Life Support Test Project even had time to dress themselves and their living quarters for Halloween.

"If this test could go any better, it would be incredible," said Nigel Packham, commander of the 90-day chamber study. "Small problems crop up of course, but you learn to deal with those and go on. But we haven't had any major issues worth reporting."

The crew has spent the last 10 days evaluating a vegetarian diet very similar to the one experts predict will be available to the first astronauts who will venture to Mars. "It's been a refreshing change from the frozen entrees that we have been consuming for the first 30 days of the test," said team member Laura Supra. "Meals prepared with fresh ingredients are

more pleasing to the palate, although we did notice a lack of variety."

Other activities the crew has been involved with include a link-up with Nottingham Country Elementary School where 30 fifth graders decided to take a leaf out of the crew's book. "These kids 'locked' themselves at school over a Friday night, pretending they were on a Martian base," said Vicki Kloeris. "It was wonderful talking to these children who couldn't quite understand how we (the chamber crew) could still be getting along with each other after 35 days. They were having trouble after just one night."

From the technical viewpoint, the crew has recycled more than 8,000 pounds of waste water (urine, humidity condensate and hygiene water) back into potable quality water that meets NASA's strict requirements for drinking.

"The biological systems which were developed here at JSC have proven themselves beyond our expectations," John Lewis said. "I never thought in my wildest dreams that we would be drinking water produced by these processors."

The science experiments also continue to go well, Packham said. "It just goes to show how well prepared the folks in the Space and Life Sciences Directorate are. If we ever need anything or have questions, they are right there with the answers."

The test is scheduled to end on Dec. 19, a total of 91 days after the crew entered the chamber in Bldg. 7 on Sept. 19. This will mark the record stay for a ground-based U.S. crew in closed life-support testing. The team welcomes comments and electronic mail. Employees also may join them in their endeavor on the Internet at <http://pet.jsc.nasa.gov>.



JSC Photo 97-13257 by Hector Gongora

ZERO-G SNOOPY—JSC Zero-Gravity Program Test Director Bob Williams gets truly special delivery of a "Silver Snoopy" award during a recent flight aboard the KC-135 zero-gravity simulating aircraft. Presenting the award are Astronauts Rick Searfoss, Dave Williams and Rick Linnehan, and witnessing the event is KC-135 Test Director Judy Rickard. The Silver Snoopy is the astronauts' own award, presented for significant outstanding contributions beyond normal work output to shuttle, payload, or space station programs.

Community News

Spinoff technology at work

NASA 'space suits' help brothers with rare defect enjoy sunshine

By Ann Hutchison

Technology being designed to protect astronauts working in space is helping two British youngsters enjoy a more normal life.

A team at JSC recently provided two specially designed "space suits" to 4-year-old Kyle and 2-year-old Ryan Richards of Shotton Colliery, England. The brothers suffer from Polymorphic Light Reaction Syndrome, which is caused by a rare genetic defect. It is characterized by extreme allergy to light that causes the skin to break out in rashes and blisters. Without the suits, the boys could venture outside only at night. Even exposure to a bright light bulb may cause an allergic reaction.

"An English newspaper journalist approached us earlier this year on behalf of the Richards family," said Robert Dotts, assistant director of Technology Transfer and Commercialization. After discussions with the family, NASA formed a small team and "set about defining suit requirements, identifying possible materials and testing them." Based on test results, NASA engineers decided on a two-layer suit, plus an active cooling system to keep the children comfortable inside the suits.

The suit's outer layer consists of a white jacket, pants, gloves and head gear, including goggles. The external garments protect the children's sensitive skin from more than 99.9 percent of the Sun's ultraviolet rays. The garments are made of a new material that should be available in several months from the Solar Protective Factory, Carmichael, Calif. The cooling undergarments, made of nylon/lycra, are based on a design worn by astronauts during space

walks and sized for the children. The cooling system—shorts and T-shirt fitted with tubes filled with ice-cooled water—is operated by a battery-powered unit worn on the waist.

The JSC team—Dotts, NASA engineers Dominic Del Rosso and Evelyne Orndoff and Dr. Smith Johnston, a NASA physician—delivered the suits to the Richards family, which was on a trip to Orlando, Fla., in late September. They accompanied the youngsters on their visit to Disney World to assist with their first extended outing while wearing the protective suits. While in Florida, the children also were able to watch a space shuttle launch.

Johnston said the NASA team closely monitored the children in the suits. Testing involved first normal children, then the Richards boys inside the home in Florida, followed by a short excursion outside. After a few minor modifications to the suits, the group made a six-hour excursion to Disney World. "This was the first time Ryan had ever been outside in the daytime," Johnston said.

The suits worn by the Richards children are prototypes of space suits being developed at JSC. "This should be a great way to test the durability of these suits," Dotts said. "Who better to give them a real work-out than a couple of active, energetic youngsters?"

Dotts said the suits' performance was "fantastic for the first prototypes." He said the team has identified "a few minor changes to the suits to improve their usability." They plan to incorporate them into another prototype suit in the next month.

NASA provided the suits through an agreement with the HED Foundation,



Photo by Robert Dotts

Kyle, left, and Ryan Richards of Shotton Colliery, England, suit up for an outing in the Sun with the help of JSC employees and two specially designed "space suits" that protect the sufferers from a rare light-sensitivity genetic defect. Kyle, 4, and Ryan, 2, made their first full-length daytime promenade at Disney World. Front row, from left, are Dr. Smith Johnston, a JSC flight surgeon, and Dominic Del Rosso, a JSC space suit engineer. Back row, from left, are family friend Margret, grandmother Eleanor Richards, Sarah Moody of the HED Foundation, and the boys' mother, Carmen Richards.

Hampton, Va., which since 1987 has provided cooling gear to children with hypohidrotic ectodermal dysplasia and with multiple sclerosis. HED is a medical disorder characterized by a lack of sweat glands, which can lead to heat exhaustion, heatstroke and even death.

JSC also is working with MicroClimate Inc., Sanford, Mich., which has developed cooling garments using a phase-change

material to provide the cooling.

Dotts said he hopes to develop a long-term agreement with the HED Foundation by the end of the year for distribution of similar suits to needy children in the U.S. and worldwide. It is estimated that several thousand children around the world suffer from various defects that cause either extreme sensitivity to light or problems in cooling their bodies.

Combined Federal Campaign makes quarter of goal

More than 500 employees have contributed \$127,153 to this year's CFC at the end of the first reporting period. Other JSC employees and retirees contributions bring the total to \$128,045.

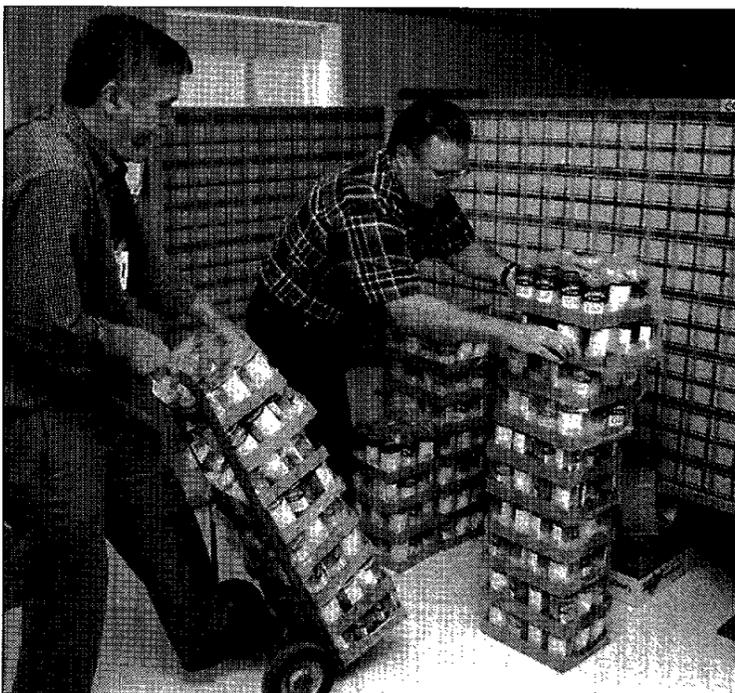
This is 26 percent toward the \$480,000 goal. Four organizations have exceeded their goal so far: Equal Opportunity Programs Office, Legal Office, Public Affairs, and Technology Transfer and Commercialization Office. The Legal Office is the first organization to have 100 percent participation.

JSC continues its drive to help others in the annual Combined Federal Campaign that began Oct. 10, shooting for \$480,000.

The CFC is a once-a-year voluntary fund-raising effort that gives JSC employees a chance to contribute to local, national, and international health and welfare charities.



Above: Boeing employees collect food and essential goods in last year's Community Outreach Food Drive. More than 11,000 pounds of food was donated by the employees to Interfaith Caring Ministries' food bank. Right: Jack Martin, left, and Michael Zachau, Boeing space station manager, organize donations from Boeing employees in last year's food drive. This year's food drive kicked off last Friday with a goal of 13,000 pounds of food. Doug Stone, Boeing's International Space Station program manager, has again encouraged employee donations by waging a friendly competition between departments. Besides asking employees to bring bags of food, Stone has asked each manager to donate his or her equivalent weight in food.



Photos courtesy Boeing

Boeing workers help at holidays

This time each year, Boeing employees gear up for community outreach events benefiting the less fortunate in the Clear Lake area. Employees get involved in a number of projects including Thanksgiving and Christmas food drives, Adopt-A-Family programs, toys and gift projects and senior citizen support activities.

Kick-off for the Boeing outreach events was last Friday, Oct. 31.



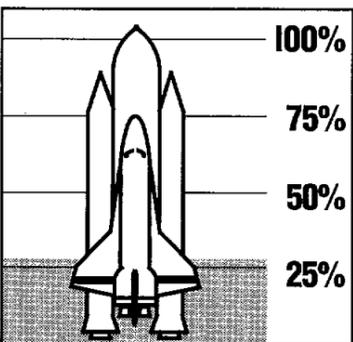
Boeing employees hope to break the records set last year. Of the \$220,000 donated to local charitable agencies, \$189,000 was directly from Boeing employee "good neighbor fund" donations. The Boeing Company donated \$31,000 in corporate contributions.

In addition, employees hope to break their food drive goal from last year where they collected 11,320 pounds of food. The non-perishables were donated to the Interfaith Caring Ministries on Egret Bay boulevard. The food collected at holiday time stocks Interfaith's food pantry until May.

This year the goal is 13,000 pounds of food. Doug Stone, International Space Station program manager, has again encouraged employee donations by waging a friendly competition between departments and encouraging managers to donate their own weight in food.

Today, about 1,900 Boeing employees work in Houston on the space shuttle, space station and other programs.

For more information on the Boeing Outreach program, contact Wendy Starr, Community Affairs manager, (281) 280-7780.



1997 GOAL: \$480,000



Special Delivery

Thanks in part to the equipment, supplies and crew member delivered by the STS-86 mission, scientific research is back in gear aboard the Mir Space Station.

STS-86 Commander Jim Wetherbee, Pilot Mike Bloomfield, Mission Specialists Dave Wolf, Mike Foale, Jean-Loup Chrétien, Wendy Lawrence, Scott Parazynski and Vladimir Titov joined Mir 24 Commander Vasily Solovyev and Pavel Vinogradov for five days of docked operations, including a space walk.

The STS-86 crew collected images inside and outside the station as it docked, undocked and flew around the Russian outpost. The crew is expected to share those images with employees this month.

1) The STS-86 and Mir 24 crew gather in the double Spacehab module for the traditional in-flight portrait. New Mir-24 crew member Wolf holds a cap at right. Counterclockwise from Wolf are Titov, Solovyev, Parazynski, Vinogradov, Wetherbee, Lawrence, Foale, Bloomfield and Chrétien.

2-5) The Russian Mir Space Station and the damage caused by a collision with a Progress resupply vehicle are documented during a fly-around orchestrated by Bloomfield.

6) Wolf spends his final days aboard *Atlantis* before transferring to duty aboard Mir. Wolf is spending four months living and working on Mir as part of the Mir 24 crew.

7) Titov checks a maze of television cables in the Spacehab module in *Atlantis*'s cargo bay. The double module was used to ferry supplies and equipment to Mir and return experiment samples and other items to Earth.

8) Lawrence, left, and Parazynski peer out of the Soyuz hatch during a visit to the Russian vehicle that delivered Solovyev and Vinogradov and remains docked to one of Mir's ports.

9) Bloomfield mans the commander's station on *Atlantis*'s forward flight deck during rendezvous operations with Mir.

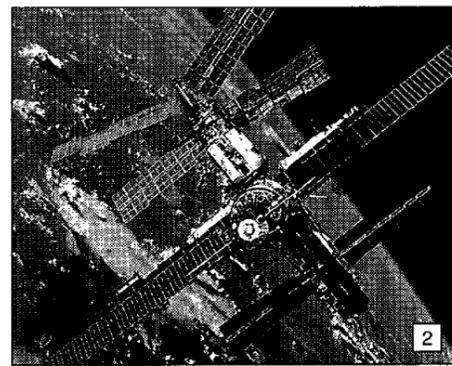
10) Parazynski's space suit visor reflects *Atlantis*'s cargo bay and the Mir space station. Parazynski and Titov spent several hours retrieving Mir Environmental Effects Packages that had been exposed to the space environment around Mir's permanent docking module since September 1996.

11) Commanders Wetherbee and Solovyev discuss the progress of the mission on *Atlantis*'s aft flight deck.

12) Foale, sporting STS-86 crew attire after four months of wearing Russian space garb, operates a video camera in Mir's base block module.



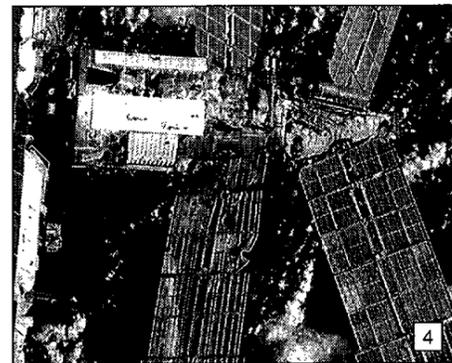
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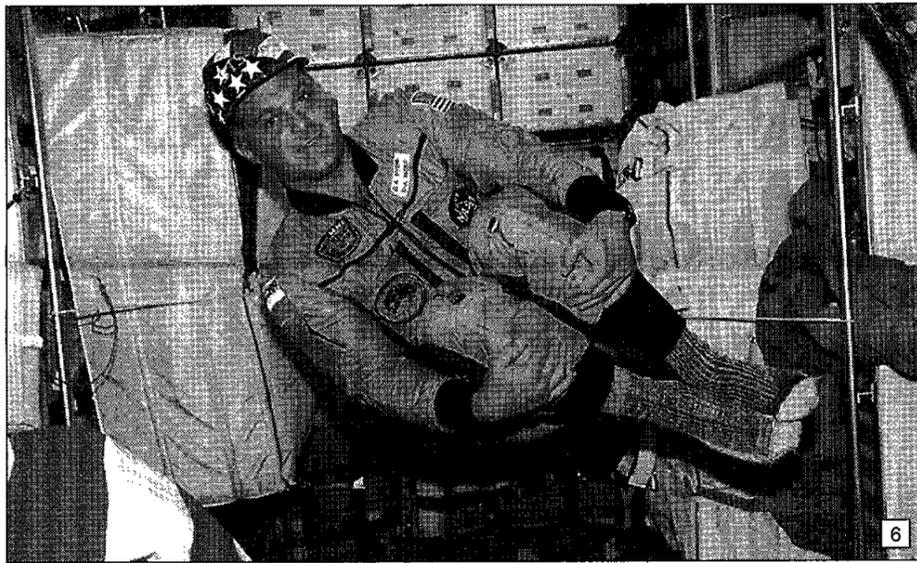
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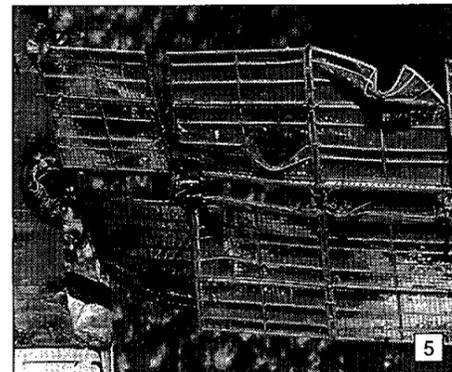
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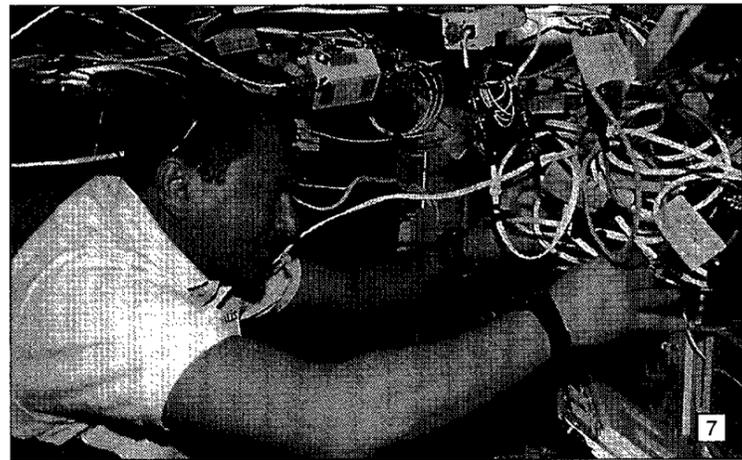
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NASA Photo STS-086-402-008



NASA Photo STS-086-387-014



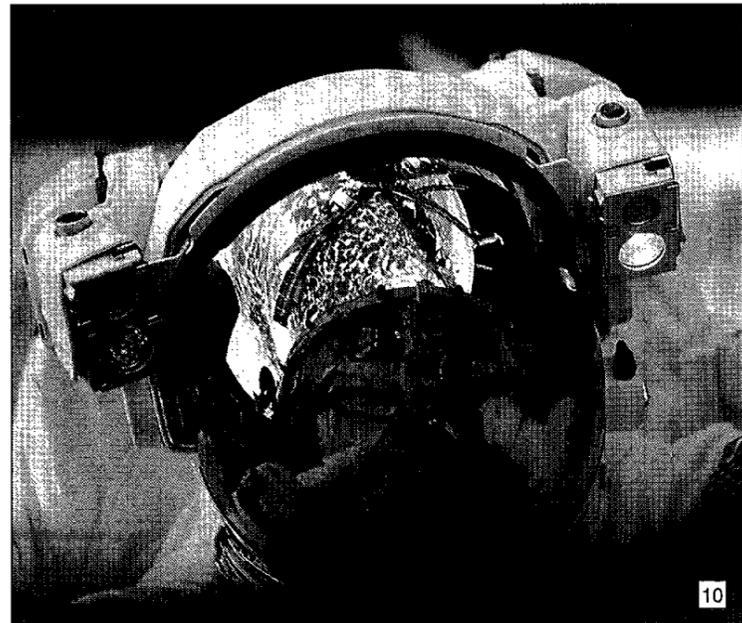
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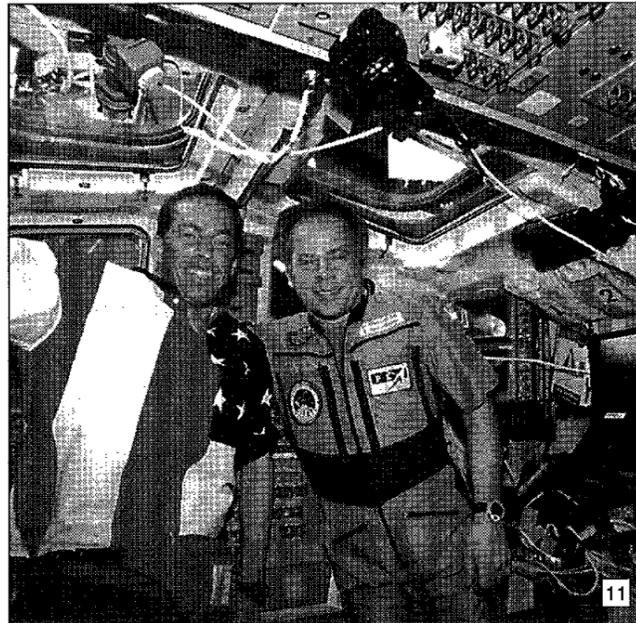
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NASA Photo STS-086-336-031



NASA Photo STS-086-729-076



NASA Photo STS-086-336-026



NASA Photo STS-086-405-008

Simulated Glass

New 'glass cockpit' for shuttle passes verification tests in Shuttle Avionics Integration Laboratory

By Jack Shea

Almost exactly two months after powering down to install a new "glass cockpit" in its shuttle flight deck the Shuttle Avionics Integration Laboratory has successfully completed a series of rigorous tests to prove it is ready to begin simulating flights.

The new display system, which uses computer screens instead of cathode-ray tubes, mechanical dials and gauges, is called the Multifunction Electronic Display Subsystem. It will allow engineers, pilots and program officials to prove out the displays' capabilities in a closed-loop simulated flight environment.

United Space Alliance, which operates the SAIL for the JSC Engineering Directorate as part of the Space Flight Operations Contract, completed the integration, site-acceptance and unique verification tests in early September.

The new system is almost completely transparent to users familiar with the original avionics system. It replaces the old Multi-Cathode Ray Tube Display Subsystem, which for more than 20 years has provided shuttle pilots with vital information from the orbiter's flight computers, beginning with the Approach and Landing Test program in 1977. MEDS also replaces the electro-mechanical dedicated displays, including the tape meters and "steam gauges" that have provided astronaut crews with primary navigation, guidance and flight control information, as well as system status.

Willie McCool is the lead astronaut assigned to support SAIL, and with other SAIL astronauts has been taking turns using the new cockpit displays to pilot the shuttle in the simulations.

"They're great!" he said between "flights." "Although we know the orbiter is a super machine, the analog displays in the cockpit are way behind the times. Pilots who come to NASA after having flown modern airliners or military aircraft with 'glass cockpit' displays are typically quite surprised when they see the Apollo-era orbiter displays."

"We were really pleased with the progress made in the installation, integration and testing of the MEDS in SAIL," said NASA SAIL Manager Bill Ritz. "As the first 'orbiter' to install and test this system, the SAIL has significantly benefited the Space Shuttle Program."

The portion of the new system that is most visible in the shuttle cockpit consists of 11 full color Multi-function Display Units, or MDUs. There are identical Liquid Crystal Displays—nine on the forward station control panels and two on the aft flight deck panels.

These displays interface with the flight computers through four Interface Display Processors, or IDP's, which utilize quadruple redundant data channels. Completing the MEDS subsystem are four Analog to Digital Converters, or ADC's. Their job is to convert the system status analog data—which was previously used to drive the panel meters—to the digital format used by the new system.

As with most new shuttle avionics subsystems, the Space Shuttle Vehicle Engineering Office required the new glass cockpit to be installed and tested in SAIL to identify problems and gain operational shelf

life in a flight system environment before it is installed in a real shuttle.

"This also provided the developers with the first real look at how the new hardware and software will perform functionally in a full-up vehicle environment," Ritz said. "Potential problem areas discovered in SAIL that were applicable to the orbiter vehicles have been closely coordinated between the USA/SAIL implementation team the NASA/Boeing development team to minimize the impact of corrective actions on the vehicle modification flows. This experience should assure a trouble-free installation of the MEDS in the orbiter fleet."

"One reason for the MEDS upgrade is that spares for the old instruments are no longer available," McCool explained. "Another is that the MEDS state-of-the-art full-color displays make for a more readable, user-friendly presentation. The biggest benefit of the MEDS upgrade, however, is its flexibility. Future enhancements can be made simply by changing the software that generates the display format, without the expense of procuring any new hardware."

"Getting a chance to try out these new displays in SAIL under flight-like conditions has been very helpful," McCool said. "In fact, our pilots have come up with some suggestions for basic improvements. We are feeding these ideas back to the development folks so that, hopefully, by the time MEDS flies for real, planned for January 1999, at least a few of these suggestions will have been incorporated."

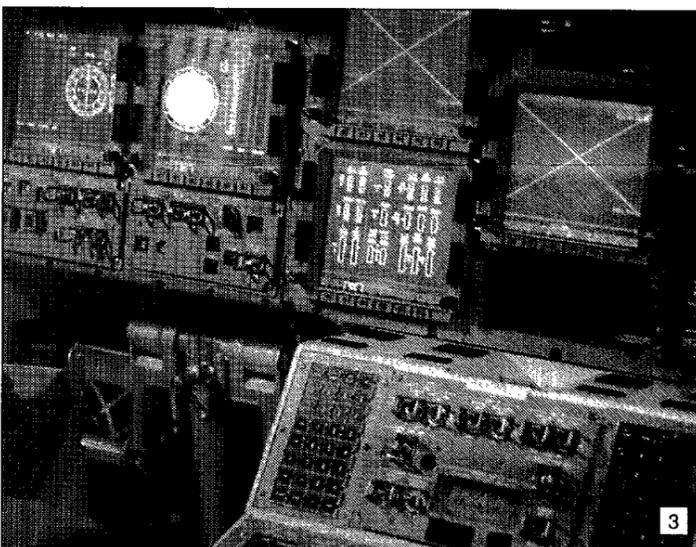
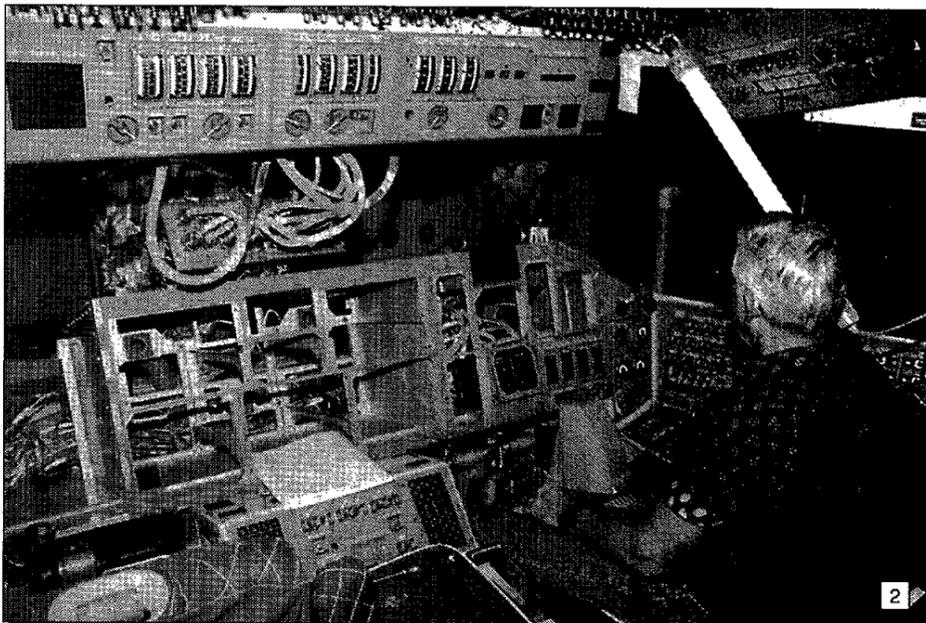
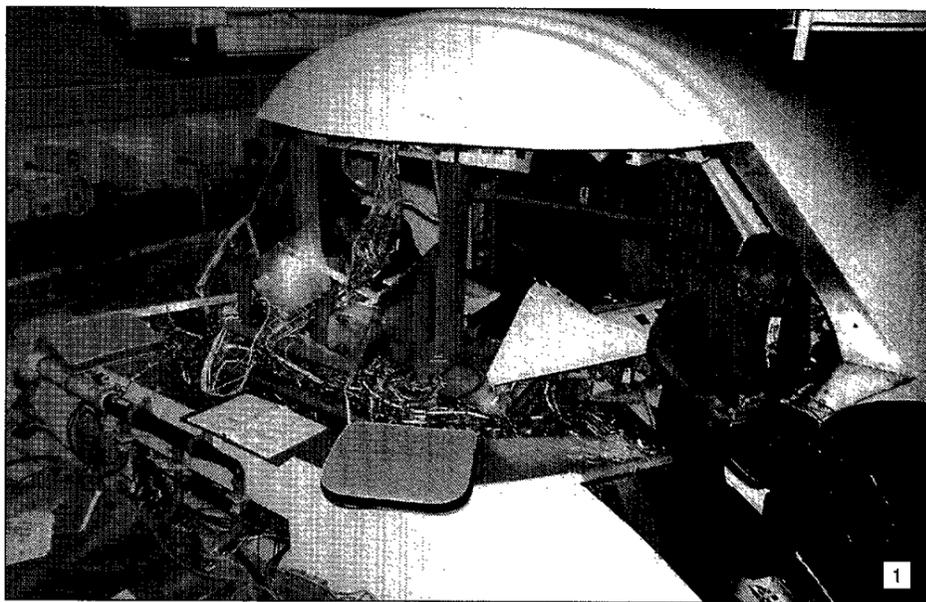
"In the future, we expect that MEDS will do much more than just duplicate the current MCDS and analog instruments. For example, it's been suggested that it could be used on-orbit to provide more situation or procedure displays for docking, or for Remote Manipulator System operations. Combined with the overall avionics upgrade, which is being looked at for possible implementation early in the next decade, the uses to which the MEDS displays can be put should be greatly expanded," McCool said.

Because it is planned for at least one of the shuttles to still be flying with the "old-fashioned" configuration until the year 2001, when *Endeavor* is scheduled for upgrade, the SAIL has maintained a backup Multi-Cathode Ray Tube Display Subsystem cockpit configuration to support mixed fleet verification testing and for mission support.

"We were fortunate in that just about the time we were planning for the MEDS modification in SAIL, we had just completed the deactivation of our Guidance, Navigation and Control Test Station, or GTS," Ritz said. "Since then, SAIL engineers have utilized the GTS cockpit and its interface equipment, connected to the primary Shuttle Test Station, to provide a secondary, MCDS-configured, cockpit for monitoring the flight simulations. This gives us the capability to support both MEDS and MCDS missions."

The next major upgrades planned for the SAIL flight system will include the single-string and three-string Global Positioning System, or GPS, configurations, followed by the Space Integrated GPS/Inertial Navigation System, or SIGI.

When these are completed, along with the major improvements to its laboratory support equipment now in work, the SAIL will be fully ready to move into its fourth decade as a world-class avionics integration facility supporting the shuttle program. □



Top to bottom: 1) United Space Alliance technicians Al Martinez, front, and Ed McCowan work to install the new Multifunction Electronic Display Subsystem in the cockpit of the Shuttle Avionics Integration Laboratory simulator. 2) Martinez, standing, and Ed McCowan, another USA technician, continue the installation. 3) This view of the new "glass cockpit" shows some of the 11 computer displays that replace the shuttle's old cathode-ray tubes and mechanical gauges. 4) NASA and Boeing North American design and system engineers include, front from left, Danny Siner, Debra Owen and Diana Schuler; middle, Mike Warner, Brent Bynum and Daryl Peltier; and back, Charles Johnson, Chris Gentz, Ed Polzin and Mike Bustos. 5) USA system engineers and technicians assigned to the MEDS installation and checkout team relax outside Bldg. 16 during a break from their efforts.

Photos by Robert Winkler

31 Years Ago at MSC



NASA JSC Photos 66-H-139 and S-66-60995

Above: The *Wasp* rolls out the red carpet. Gemini XII Astronauts Edwin Aldrin, left, and James Lovell, right, pause momentarily at microphones aboard the *USS Wasp* on Nov. 15, 1966, following their splash-down and recover in the Atlantic Ocean some 600 miles southeast of Cape Kennedy. Below: Gemini XII, we've got you on the tube. Flight controllers and Gemini program officials follow the events of the flight from the Mission Control Center.



Twice-scrubbed Gemini XII scheduled for launch today

[Reprinted from the Nov. 11, 1966, *Space News Roundup*]

After two 24-hour scrubs because of second-stage launch vehicle autopilot problems, Gemini XII at Roundup press time was scheduled for launch at 2:46 CST today. Gemini XII was originally scheduled for launch Wednesday, but failure of a secondary autopilot power supply during Tuesday's midcount forced the first 24-hour postponement.

The faulty component was replaced and tests were continued in the repeat midcount Wednesday morning. Autopilot rate gyros did not

operate at the proper synchronous speed during the second midcount and the launch again was postponed 24 hours. The second problem in the autopilot was not related to the first problem. The primary autopilot showed no anomalies during the tests, but since mission rules call for both autopilots to be working prior to launch, the mission was twice postponed.

Weather in the launch area was forecast to be acceptable for today's launch.

Launch times for both the Atlas/Agena rendezvous vehicle and

Gemini XII were moved to eight minutes earlier to retain the same star fields. The only major change to the flight plan was elimination of the solar eclipse photography which was scheduled for Sunday morning during a pass over South America where the crew of Gemini XII would have seen some 20 seconds of total eclipse of the Sun.

The Gemini XII crew spent the two scrub days practicing various phases of the mission in the Gemini Mission Simulator at Kennedy Space Center, and in review of the flight plan.

Gemini XII flight closes out achievement-packed program

[Reprinted from the Nov. 25, 1966 edition of *Space News Roundup*]

A highly-successful Gemini XII mission last week punctuated the Gemini Program story with a final period as the spacecraft splashed down within three miles of the prime recovery vessel. As the Gemini story was wrapped up, and became a part of manned space flight history, Apollo waited to tell its narrative.

Gemini XII met all mission objectives except that of going to a 400 n.m. apogee. Ignition of the Agena's primary propulsion system was ruled out when insertion telemetry showed that the Agena's main engine turbopump ran overspeed.

The Agena rendezvous vehicle was launched by an Atlas Standard Launch Vehicle at 1:07:58 p.m. CST Nov. 11. The Agena placed itself into an orbit measuring 159 n.m. perigee by 163 n.m. apogee.

The Gemini countdown, meanwhile, went smoothly through crew insertion, hatch closure and the built-in hold at T minus 3 minutes. Liftoff was at 2:46:33 p.m. CST, and the launch vehicle inserted Gemini XII into an 87 nm by 152 nm orbit.

Gemini XII Crewmen James Lovell

and Edwin "Buzz" Aldrin immediately began onboard computation for the M=3 rendezvous with the Agena. Lovell's first docking was at 4:16 p.m. CST over the tracking ship *Coastal Sentry* south of Japan.

Since the Agena was "no-go" for the high-apogee primary propulsion system burn, a retrograde burn of 43 fps was made at 7:05:06 ground elapsed time (GET) using the Agena secondary propulsion system to phase the spacecraft orbit to rendezvous with last Saturday's total eclipse of the Sun over South America....

Following eclipse photography, Aldrin made the first of two stand-up extravehicular activities. Hatch opening took place at 19:29:01 GET; closure was two hours 29 minutes later after Aldrin completed photographic and scientific experiment tasks....

Sunday's activities mainly revolved around Aldrin's umbilical EVA. Hatch opening was at 42:46 GET and hatch closing was two hours and nine minutes later. While on the 30-foot umbilical, Aldrin performed measured work tasks at the Agena docking adapter and at a work station in the spacecraft adapter.

While on umbilical EVA, Aldrin attached the 100-foot tether stowed in the Agena adapter to the Gemini docking bar in preparation for the tethered operations.

Gemini XII backed out of the Agena docking collar at about 47:37 GET and the gravity gradient appeared to be established by one revolution later. The tether exercise lasted four hours and 17 minutes.

The crew immediately went into preparations for the second standup EVA in which Aldrin jettisoned unused equipment and conducted additional experiments and photography. Hatch open time was 66:04 GET for a duration of 59 minutes. Total EVA time for the Gemini XII mission was three hours 37 minutes....

Tuesday's retrofire took place over Canton Island at 94:00:01 GET, with a normal reentry following. Splash was at 94:34:31 GET (1:21:04 CST). Gemini XII landed about three miles from the prime recovery vessel, the *USS Wasp*, and about four miles from the aiming point. Both crewmen were picked up by helicopter and were welcomed aboard within a half hour after landing. The spacecraft was aboard a little more than an hour after splash.

Gilruth Center News

Hours: The Gilruth Center is open from 6:30 a.m.-10 p.m. Monday-Thursday, 6:30 a.m.-9 p.m. Friday, and 9 a.m.-2 p.m. Saturday.

Sign up policy: All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a yellow Gilruth or weight room badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

Gilruth badges: Required for use of the Gilruth Center. Employees, spouses, eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday; and 9 a.m.-2 p.m. Saturdays. Cost is \$10. Dependents must be between 16 and 23 years old.

Hatha Yoga: A stress relieving, stretching and breathing exercise routine to unite body, mind and spirit. Classes meet from 5:30-6:30 p.m. Thursdays. Cost is \$40 for eight weeks.

Nutrition intervention program: A six-week program to learn more about the role diet and nutrition play in health, including lectures, private consultations with a dietitian and blood analysis. Program is open to all employees, contractors and spouses. For more information call Tammie Shaw at x32980.

Defensive driving: One-day course is offered once a month. Pre-registration required. Cost is \$25. Call for next available class.

Stamp club: Meets at 7 p.m. every second and fourth Monday in Rm. 216.

Weight safety: Required course for employees wishing to use the weight room will be offered from 8-9:30 p.m. Call for next available class. Pre-registration is required. Cost is \$5. Annual weight room use fee is \$90. Additional family members are \$50.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

Aikido: Introductory martial arts class meets from 5:15-6:15 p.m. Tuesday and Wednesday. Cost is \$35 per month. New classes begin the first of each month.

Step/Bench aerobics: Classes meet from 5:15-6:15 p.m. Monday, Tuesdays and Thursdays. Cost is \$32 for eight weeks. Kristen Maidlow, instructor.

Ballroom dancing: Beginner classes meet from 7-8:15 p.m. Thursdays. Intermediate and advanced classes meet from 8:15-9:30 p.m. Cost is \$60 per couple.

Country and western dancing: Beginner class meets 7-8:30 p.m. Monday. Advanced class (must know basic steps to all dances) meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

Fitness program: Health Related Fitness Program includes a medical screening examination and a 12-week individually prescribed exercise program. For more information call Larry Wier at x30301.

Gilruth Home Page: Check out all activities at the Gilruth online at: <http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm>

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday and in the Bldg. 3 Exchange Store from 7 a.m.-4 p.m. Monday - Friday. For more information call x35350 or x30990.

Galveston Storm vs. Corpus Christi Sharks, Southwest Basketball League, 7 p.m. Nov. 7, Moody Gardens Convention Center, regular seating \$20, VIP seating \$40, on sale through Nov. 1.

EAA Wursthfest Bus Trip: Nov. 8, \$20, on sale through Oct. 31.

EAA Texas Renaissance Festival Bus Trip: Nov. 15, adults \$17.50; children (5-11) \$11; under 5 (but need bus seat) \$5; on sale through Nov. 14.

Texas Renaissance Festival: adults, \$12; children 5-12, \$5.50.

EAA Christmas Dinner/Dance: Dec. 13, \$25 per person

Astroworld: \$19 Blue Light Special, valid only in Houston, through Jan. 4.

Moody Gardens: Tickets are \$9.50 for two of four events.

Seaworld: Adult \$27.25; children (3-11) \$18.25.

Space Center Houston: Adult \$8.95; children (4-11) \$6.40 JSC civil service employees free.

Movie discounts: General Cinema, \$5.25; AMC Theater, \$4.50; Sony Loew's Theater, \$4.75.

Shirts: JSC logo T-shirt, \$10, polo style, \$23; International Space Station logo golf shirts, \$26 and \$28.

Stamps: Book of 20, \$6.40.

1998 Franklin Planner replacement refill orders being taken now.

Sweetwater Pecans: Orders are being taken now; cost is \$5.75 per pound.

Metro passes: Tokens and value cards available.

Book available: Suddenly Tomorrow Came: A History of Johnson Space Center.

Upcoming events: EAA Spring Break Ireland Trip: March 21-29, \$1,399 per person, double occupancy (\$200 deposit pre person, final payment due Jan. 21).

Space Flight Awareness program honors excellence; 30 get to view STS-86 launch

By Lois Walker

The Space Flight Awareness Program exists for one very important reason—to remind NASA and industry employees of the importance of their work on flight systems and other critical mission support tasks that contribute to astronaut safety and mission success.

Through awards, publications, and a variety of motivational tools such as posters, lapel pins, buttons, and decals, the SFA Program (formerly known as Manned Flight Awareness) provides employees with information on current space activities, the status of upcoming projects, and space program history. The program conducts workshops and participates in conferences that stress quality, education, recognition, and teamwork. The program also assists schools, civic groups, and clubs interested in space and science.

SFA honors employees who make significant contributions and

improvements to the human space program. A panel of representatives from each center, major industry contractors, and other groups determine the recipients for the following SFA honors:

Silver Snoopy Award—An astronaut personally presents the recipient with a flown Silver Snoopy lapel pin and certificate in recognition of significant outstanding contributions beyond normal work output to shuttle, payload, or space station programs.

Space Flight Awareness Team Award—Team members receive a certificate with a flown miniature orbiter flag and a lapel pin for exemplary work while accomplishing a task or goal in support of human space programs.

Flight Safety Award—The recipient receives a special award for identifying, reporting, or correcting a safety hazard that could affect the vehicle, crew, or mission.

Launch Honoree Award—The

highest tribute paid to government and industry workers recognizes quality work leading to safe space flight. The award consists of a trip to Kennedy Space Center to view a shuttle launch, a reception in their honor, a VIP tour of KSC, and a certificate and lapel pin.

Thirty Space Flight Awareness launch honorees from JSC were among those at the Banana Creek VIP Viewing Area watching as the launch of STS-86 brilliantly lit up the night sky over Kennedy Space Center.

Recipients of NASA's SFA Honoree award, given to a select few in recognition of their dedication to quality work and flight safety, also received a tour of KSC and were guests of honor at a reception where astronauts, NASA and contractor management applauded their outstanding work and dedication.

Astronaut Pam Melroy presented each honoree with a framed certificate and lapel pin at JSC's awards



STS-86 Space Flight Awareness honorees included, seated from left: Carolyn Krumrey, Jeannine Coulter, Wanda Frederick, Jo Corey, Becky Difard, Lisa Rea Phillips, Rae Lawrence, Marie Kowal, Sharon Conover and Lorraine Benavides. Second row, from left: Mark Thiessen, Y.M. Kuo, Ted Buras, Travis Smith, Forrest Lumpkin, Alton Costley and David Glover. Third row: Pat O'Rear, Michael Koester, B.G. Smith, Fred Skinner, Gary Peyton, Chris Ortiz, Louis Parker, Mark Snowden, Ed Faircloth, Stan Schaefer, Tim Ames and Richard Lee. Scott Roos was not present for the photo.

breakfast held during the event.

The next Space Flight Awareness Honoree Event is scheduled to be held in conjunction with the

launch of STS-89 in mid-January.

For more information concerning the SFA Program, contact Lois Walker at 483-8425.

People on the Move

Human Resources reports the following personnel changes as of October 25:

New Management Assignments

Lorraine Anderson is appointed deputy manager, Sustaining Engineering in the International Space Station Program Office.

Additions to the Workforce

Darrel Graziani joins the Plant Engineering Division in the Center Operations Directorate as an environmental engineer.

Becky Stinson joins the Financial Management Division in the Office of the Chief Financial Officer as a secretary.

Yolanda Garza joins the Engineering Office at the White Sands Test Facility as a secretary.

Promotions

Laura Wright was selected as a secretary in the Business Management Directorate.

Carrie Leffert was selected as a secretary in the Mission Operations Directorate.

Resassignments

Patty Meyer moves from the International Space Station Program Office to the Mission Operations Directorate.

Dallas Ives moves from the Mission Operations Directorate to the Engineering Directorate.

Lynn Wagner moves from the Engineering Directorate to the Information Systems Directorate.

Lorraine Anderson moves from the Mission Operations Directorate to the International Space Station Program Office.

Debbie Graham of the International Space Station Program Office moves to Goddard Space Flight Center.

Resignations

Matt Abbott of the Mission Operations Directorate.

Four-time flyer Henricks to retire in November

Four-time shuttle astronaut Terence T. "Tom" Henricks will retire this month from NASA and the Air Force to begin a career in private industry.

Henricks, a native of Ohio, will join The Timken Company in Canton, Ohio.

Selected as an astronaut in 1985, Henricks has commanded two shuttle missions and piloted two others. His first flight was as pilot on STS-44 in November 1991 and was followed by STS-55

in April/May 1993. He was the commander of STS-70, dubbed the "all Ohio crew," in July 1995 and commanded STS-78 in July 1996.

Retiring as a colonel in the U.S. Air Force, Henricks will conclude a 23-year military career.

"I will miss the wonderfully talented, dedicated people that make each space shuttle mission a success," Henricks said. "Their combined efforts presented experiences which I will cherish for the rest of my life. My 12 years at NASA literally flew by!"

"We wish Tom all the best as he returns home to pursue this new opportunity," said David Leestma, director of Flight Crew Operations. "We will miss his experience and friendship."



Henricks

Employees' children earn scholarships

The children of two JSC employees have each won one of the Houston Area Federal Business Association annual scholarships.

Tracy Morrey, daughter of Al Morrey from the EVA and Flight Crew Business Management Office, was selected for the second year in a row to receive one of the \$500 scholarships. Morrey is attending Texas Women's University and is pursuing a bachelor of science degree in occupational therapy. She

is carrying a 3.89 GPA and is in her senior year.

Matthew Lichter, son of Elaine Ackel from Engineering's Crew and Thermal Systems Division, will receive one of the \$500 scholarships from the FBA; he is also a recipient of one of the 1994 JSC Exchange scholarships. Ackel is a junior at the University of St. Thomas in general studies with emphasis in business administration and is carrying a 3.43 GPA.

Manager's Message

By Lee Norbraten
Director, ISO 900 Office

On Nov. 17-21, JSC's Quality System will be audited by an external company to see if we are operating in compliance with the ISO 9001 standard.

NASA is the first federal agency to require ISO 9001 certification, and if our audit is successful JSC will be the first NASA field center to achieve certification. It will also be one of the largest and most technically complex organizations ever registered. Compliance to ISO 9001 affects all aspects of how JSC manages its programs and projects, and it affects all employees, both civil servant and contractor, who support JSC's initiatives. The effort given to assure successful registration has been remarkable.

It is now up to JSC to assure that the disciplined framework of ISO 9001 is utilized to improve the quality of the work we perform. Our charter to lead the world in human space exploration demands nothing less than the best we can possibly be.



Dates & Data

Nov. 7

College of Engineering briefing: The University of Houston Cullen College of Engineering will host a briefing on graduate engineering opportunities at 10 a.m. Nov. 7 in Bldg. 45, Rm. 128. For details, call Kazuko Hall-Farley at x33075.

Museum presentation: Texas Energy Museum presents "Mars Life and Exploration" Space Science and Technology Lecture Series at 5 p.m. Nov. 7 at Texas Energy Museum, 600 Main Street, Beaumont. Dr. Graham Ryder will speak on "Exploring Our Moon." For details, call 833-5100, 880-8186 or 880-8237.

Nov. 8

Star Party: The JSC Astronomical Society and Challenger 7 Memorial Park on NASA Road 1 West invite the public to view the stars of fall from dusk until 10 p.m. Nov. 8. Telescope viewing and more will be free to the public. For details contact Bill Williams at x32272.

Nov. 11

Aero club meets: The Bay Area Aero Club will meet at 7 p.m. Nov. 11 at the Houston Gulf Airport clubhouse at 2750 FM 1266 in League City. For more information call Larry Hendrickson at x32050.

NPMA meets: The National Property Management Association will meet at 5 p.m. Nov. 11 at Robinette and Doyle

Caterers, 216 Kirby in Seabrook. Dinner costs \$14. For more information call Sina Hawsey at x36582.

Nov. 12

STS-86 briefing: NASA employees, their families and the public are invited to a briefing at 7 p.m. Nov. 12 at Space Center Houston. The STS-86 crew will discuss its recent mission and show photographs and video. The briefing will be followed by a showing of the IMAX film "Mission to Mir." For details call 244-2100.

Astronomy seminar: The JSC Astronomy Club will meet at noon Nov. 12 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For details, call Al Jackson at x35037.

Communicators meet: The Clear Lake Communicators will meet at 11:30 a.m. Nov. 12 at Lockheed Martin, 555 Forge River Road. For more information, contact Richard Lehman at 281-333-6004 or Melissa Sommers at 281-332-0698.

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Nov. 12 at the House of Prayer Lutheran Church. For details, call Jeannette Darcy at x45752.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. Nov. 12 at United Space Alliance, 600 Gemini. For details, call Patricia Blackwell at 281-282-4302 or Brian Collins at x35190.

PSI meets: The Clear Lake/NASA Chapter of Professional Secretaries International will meet at 5:30 p.m. Nov. 12 at the Holiday Inn, NASA Road 1. Dinner costs \$13. For details, call Elaine Kemp at x30556.

Longhorn Open House: The Longhorn Project will host an Open House from 10 a.m.-2 p.m. Nov. 12-13. All JSC employees and contractors including their families are invited to get a first-hand look at this innovative educational project and see the Texas Longhorn steers up close. For more information, call Don Holick at x38039.

Nov 13

MAES meets: The Society of Mexican American Engineers and Scientists will meet at 5 p.m. Nov. 13 at Mario's Pizza in Webster. For details, call Gerard Valle at x38835.

NMA meets: The JSC National Management Association will meet at 5:30 p.m. Nov. 13 at the Gilruth Center ballroom. Dr. Bobby Alford will speak on the "National Space Biomedical Research Institute and Human Exploration and Development of Space—The Challenges Before Us." Dinner begins at 7 p.m. and is free to members, for non-members the cost is \$12. To RSVP or for more information, call Elizabeth Fountain at x35257.

Nov. 14

Astronomers meet: The JSC

Astronomical Society will meet at 7:30 p.m. Nov. 14 at the Center for Advanced Space Studies, 3600 Bay Area Blvd. For more information, call Chuck Shaw at x35416.

Space society meets: The Clear Lake Area Chapter of the National Space Society will meet at 6:30 p.m. Nov. 14 at the Hobby Airport Radisson. Harry Dace will speak on "Advent Launch Services." This meeting is open to the public with a \$5 donation. For more information, call Murray Clark at 281-367-2227.

Museum presentation: Texas Energy Museum presents "Mars Life and Exploration" Space Science and Technology Lecture Series at 5 p.m. Nov. 14 at Texas Energy Museum, 600 Main Street, Beaumont. Dr. Mike Zolensky will speak on "Aladdin: A Martian Moon Sample Return Mission." For details, call 833-5100, 880-8186 or 880-8237.

Nov. 19

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Scuba club meets: The Lunarins will meet at 7:30 p.m. Nov. 19 at the Redfish Restaurant under the Kemah/Seabrook bridge, Seabrook side. For more information, call Fred Toole at x33201.

Nov. 20

Directors meet: The Space Family Education board of directors will meet at 11:30 a.m. Nov. 20 in Bldg. 45, Rm. 712D. For more information on this open meeting, call Gretchen Thomas at x37664.

Museum presentation: Texas Energy Museum presents "Mars Life and Exploration" Space Science and Technology Lecture Series at 5 p.m. Nov. 20 at Texas Energy Museum, 600 Main Street, Beaumont. Dr. David Black will speak on "The Search for Other Planetary Systems and Habitable Planets." For more information, call 833-5100, 880-8186 or 880-8237.

NASA Briefs

Marshall boss Littles to retire

Dr. Wayne Littles, director of the Marshall Space Flight Center, will retire from NASA on Jan. 3. NASA is proceeding with the search for a successor. Littles became the center's eighth director in February 1996. "Wayne Littles has been one of NASA's brightest stars," NASA Administrator Daniel S. Goldin said. "He has helped the agency meet the challenges of the next millennium." Littles joined NASA and Marshall in 1967, moving rapidly through its ranks. He was director of Marshall's Science and Engineering Directorate and became deputy center director in 1989. In 1994, he was appointed NASA's Chief Engineer and then associate administrator for space flight. He characterized his decision to retire as "the toughest of my professional career."

X-33 program passes full design review

Government and industry representatives have successfully completed a design review of the X-33 technology demonstration program, giving the go ahead for fabrication of all remaining components, completion of subsystems and assembly of the subscale prototype launch vehicle. "We've had an excellent review of the program, and we're ready to go ahead with all remaining fabrication and assembly for the X-33," said NASA X-33 program manager Gene Austin of Marshall Space Flight Center. The five-day operations and systems Critical Design Review at Edwards Air Force Base, Calif., was the culmination of 51 subsystems and component reviews held since January. The X-33 is a subscale prototype of a full-scale, commercially developed "VentureStar" reusable Launch Vehicle planned for use after the turn of the century to dramatically reduce the cost of going to orbit.

Safety day blood drive nets 23 percent participation increase

The JSC On-site Blood Drive Program completed another big year with 508 donations at the two-day drive held in conjunction with Safety and Total Health Day. The program netted 1,513 donations overall in 1997, compared to 1,226 in 1996—a 23 percent increase in participation. St. Luke's and the JSC Blood Drive Committee issued their thanks to everyone at JSC who made the successful year possible by donating so generously.

Buyout provides opportunity for limited number of JSC employees

(Continued from Page 1)

Not eligible are astronauts, medical officers, pilots, attorneys, GS-14 and below certified flight controllers, trainers and flight design analysts, reemployed annuitants, temporary or term employees or employees retiring with a disability.

The eligible organizations and the number of slots available in each are: Engineering, 8; Mission Operations, 7; Space and Life Sciences and Information Systems, 6 each; Business Management and Safety, Reliability and Quality Assurance, 5 each; Space Station and White Sands, 4 each; Equal Opportunity, Flight Crew Operations, Center Operations and Space Operations Management, 2 each; and Human Resources, Chief Financial Officer,

By Jovan-Justine Love

Every directorate at JSC is gearing up in a big way for Inspection 97. Preparations are well under way to showcase 185 exhibits in 22 buildings to leaders in business, industry, education and community affairs. About 800 scientists, engineers, technical experts and administrative personnel will serve as tour guides, hosts, exhibitors, and registration assistants Nov. 12-14. All employees are encouraged to visit the exhibits of interest as their schedules permit.

Thousands of visitors from a variety of fields, including those who have never experienced the space technology environment at JSC, are expected to attend JSC's second inspection opportunity.

"We here at the Johnson Space Center recognize how important it is

to develop relationships and share ideas with our neighbors both in Houston and beyond," said JSC Director George Abbey. "This is a great opportunity to share and see how our technology works and connects with others."

The technology transfer process involves moving ideas, concepts and products from the government arena into the private sector sometimes directly and sometimes through cooperative development projects.

"This event is an excellent opportunity for business and industry leaders to see our technical advances and discuss common technical challenges with our engineers, scientists, and managers," said Inspection 97 Chair Doug Blanchard.

Exhibits cover a wide range of

current technology such as virtual reality, robotics, microwave technology, next generation space power, biotechnology tissue engineering, Internet and Intranet repositories and more.

Bldg. 9—with Inspection 97 registration and more than 50 exhibits—will be the heart of the event. Displays will be stationed throughout the building with eight exhibits about the space shuttle program, nine featuring the International Space Station, and 30 other exhibits on health, medicine, nutrition, education, business, technology transfer and commercialization.

Visitors and JSC employees may pick up a copy of the event tour guide with a complete listing of the 185 Inspection 97 exhibits at information booths located in Bldg. 2 and 9.

Bldg. 2 and Teague Auditorium will be a key focal point as well. There will be speakers discussing the center's programs, and exhibits from other NASA centers. Each day at 11 a.m., 1 p.m. and 3 p.m., various JSC managers will give talks on subjects ranging from the Apollo era to the International Space Station to life on Mars.

Inspection 97 guests will park in the parking lots near Bldg. 9. The four lots surrounding Bldg. 9, the two small lots between Bldgs. 31 and 37; and the large lot south of Bldg. 31 will be closed to JSC employees and contractors who should park in the lots west of Bldg. 45 and on the east side near Bldgs. 28 and 35. Shuttle buses will be provided to take employees and contractors from those lots to their buildings.

Tiny satellite to view repeat space walk

(Continued from Page 1)

Scott and Doi will venture out for the fortieth space walk outside the shuttle to evaluate tools, techniques and equipment that will be used in the assembly of the International Space Station era. The space walk combines most of the activities that had been planned to be carried out on STS-80, but were postponed when the hatch jammed preventing the space walk from taking place.

One unique addition to the space walk is the test of a basketball-sized satellite containing small nitrogen gas thrusters and tiny cameras that will be flown remotely from the crew compartment. In addition to piloting the shuttle for the first time, Lindsey is in the enviable position of "piloting" the Sprint satellite, known as AER-Cam (Autonomous Extravehicular Robotic Camera).

Lindsey will maneuver the satellite around the payload bay during the space walk using a joystick and monitors on the flight deck to test the AER-Cam's ability to send television views of the EVA in progress as well as some hard to see places that could be useful in remotely investigating areas on the ISS that later could assist repair or maintenance work.

After the space walk, the crew



NASA Photo 97-14728 by Benny Benavides

STS-87 crew members inspect equipment they will use on the 16-day flight at the routine bench review at the Boeing Flight Equipment Processing Facility. Boeing workers, left, assist crew members Kevin Kregel, Leonid Kadenyuk, Takao Doi and Kalpana Chawla.

will "settle down into the meat of the mission," according to Kregel, which is the operation of the United States Microgravity Payload experiment package comprised of six payload bay investigations and a middeck glovebox designed for material and biological science experiment handling.

Kadenyuk has waited 20 years for a space flight. He is an experienced test pilot trained to pilot the Soyuz spacecraft as well as the Russian shuttle, called Buran. He'll focus on a plant growth investigation on the middeck called the Collaborative Ukrainian Experiment.

The launch from Pad 39B will be the first since significant modifications were made following the STS-81 launch back in January. New long-run cables, state-of-the-art elevators and a new shuttle air-conditioning system were installed during this refurbishment period.

Since *Columbia's* last flight, a single-cell voltage monitoring system for the fuel cells has been installed to provide more refined fuel cell data before and after launch. This consists of off-the-shelf hardware installed in the crew module and midbody.

JSC undergoes ISO 9001 independent audit

Registration of the JSC Quality System is just around the corner.

From Nov. 17-21, independent auditor National Quality Assurance will assess how well the JSC Quality System operates under the International Organization of Standards, or ISO 9001, guidelines.

From the ISO 9000 pilot program that began in 1995, to the May 23,

1997 declaration by JSC Director George Abbey that the quality system was operational, JSC has progressed far toward the realization of a fully functioning ISO 9001-compliant quality system, said ISO 9000 Office Director Lee Norbraten.

Norbraten encouraged everyone at JSC to get involved and to stay involved with the JSC Quality

System so that the center can assure that it meets or exceeds its customer's requirements for safety, performance, cost and schedule.

The ISO 9000 Office dedicated the month of October to providing training on the JSC Quality System to civil service and contractor employees. More than 5,000 people participated in that training.



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Editor Kelly Humphries

Foale says merger of space programs complementary for America, Russia

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currently doesn't have, referring to the large liquid-fueled Energia rocket.

"The merging of our programs is technologically complementary," he said. "As such, it is overall more effective if we work together in achieving these technological goals than if we work separately."

Appearing fit and reporting that he can already jog for several miles, Foale said 99 percent of the time he was on the Russian outpost he was having a good time. He said he enjoyed the challenge of trying to fix things, and that he and his Russian crew mates—Vasily Tsibliev and Alexander Lazutkin, and later Anatoly Solov'yev and Pavel Vinogradov—have left his successor,

Dave Wolf, in good shape to carry on his scientific program and pave the way for Andy Thomas, the final American scheduled to work on Mir.

Foale said that in spite of significant problems that occurred during his stay, from cooling and guidance system difficulties to the collision of the Progress supply vehicle, the crew never panicked and was able to maintain a sense of humor.

"I was in fear for my life for about one second, and that was the impact of the Progress on the station. And that was probably the case of the whole crew," he said. "But as soon as we realized a second had passed and we were still conscious, it turned into a situation of find out what happened and try and do the next best thing. Beyond that moment, I never